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EXAMINER

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ART UNIT	PAPER NUMBER
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2121

DATE MAILED: 09/23/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Ppe

Office Action Summary

Application No.

09/915,188

Applicant(s)

DUTE ET AL.

Examiner

Aaron C Perez-Daple

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 7/25/01.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-81 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-81 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6, 7.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: the inventors should not be listed in the specification.

Appropriate correction is required.

2. The applicant is reminded of the proper format for the specification:

Content of Specification

- (a) Title of the Invention: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.
- (b) Cross-References to Related Applications: See 37 CFR 1.78 and MPEP § 201.11.
- (c) Statement Regarding Federally Sponsored Research and Development: See MPEP § 310.
- (d) Incorporation-By-Reference Of Material Submitted On a Compact Disc: The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e) and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

Or alternatively, Reference to a "Microfiche Appendix": See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.

- (e) Background of the Invention: See MPEP § 608.01(c). The specification should set forth the Background of the Invention in two parts:
 - (1) Field of the Invention: A statement of the field of art to which the invention pertains. This statement may include a paraphrasing of the applicable U.S. patent classification definitions of the subject matter of the claimed invention. This item may also be titled "Technical Field."

- (2) Description of the Related Art including information disclosed under 37 CFR 1.97 and 37 CFR 1.98: A description of the related art known to the applicant and including, if applicable, references to specific related art and problems involved in the prior art which are solved by the applicant's invention. This item may also be titled "Background Art."
- (f) Brief Summary of the Invention: See MPEP § 608.01(d). A brief summary or general statement of the invention as set forth in 37 CFR 1.73. The summary is separate and distinct from the abstract and is directed toward the invention rather than the disclosure as a whole. The summary may point out the advantages of the invention or how it solves problems previously existent in the prior art (and preferably indicated in the Background of the Invention). In chemical cases it should point out in general terms the utility of the invention. If possible, the nature and gist of the invention or the inventive concept should be set forth. Objects of the invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.
- (g) Brief Description of the Several Views of the Drawing(s): See MPEP § 608.01(f). A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.
- (h) Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.
- (i) Claim or Claims: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. There may be plural indentations to further segregate subcombinations or related steps. See 37 CFR 1.75 and MPEP § 608.01(i)-(p).
- (j) Abstract of the Disclosure: See MPEP § 608.01(f). A brief narrative of the disclosure as a whole in a single paragraph of 150 words or less commencing on a separate sheet following the claims. In an international application which has entered the national stage (37 CFR 1.491(b)), the applicant need not submit an

abstract commencing on a separate sheet if an abstract was published with the international application under PCT Article 21. The abstract that appears on the cover page of the pamphlet published by the International Bureau (IB) of the World Intellectual Property Organization (WIPO) is the abstract that will be used by the USPTO. See MPEP § 1893.03(e).

- (k) Sequence Listing. See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The requirement for a sequence listing applies to all sequences disclosed in a given application, whether the sequences are claimed or not. See MPEP § 2421.02.

Claim Objections

3. Claims 2-81 are objected to because of the following informalities: improper grammatical structure of multiple claims, including claims 2, 8, 16-23, 48, 51-62, 66, 68-72, 78 and 81. Specifically, the grammatical structures “wherein...comprising,” “wherein...including” and “wherein...corresponding” are used incorrectly throughout the claims. The correct grammatical structures are “wherein...comprises,” “wherein...includes” and “wherein...corresponds,” respectively. Appropriate correction of all claims employing these or analogous grammatical structures is required.
4. Line 2 of claims 40 and 58 recites “the state of a sensor” where it should recite “a state of a sensor.” Appropriate correction is required.
5. Lines 2-3 of claims 41 and 59 recite “voltage determine sensor state” where they should recite “voltage to determine a sensor state.” Appropriate correction is required.
6. Two claims number 76 have been presented. The second claim 76, lines 28-29 of page 36 of the claims, improperly refers to itself. Claim 77 is dependent of the second claim 76 and therefore suffers from the same objections as claim 76. Accordingly, second claim 76 and claim 77 have not been further considered on their merits.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claim 17 recites the limitation "said external controller" in line 2. There is insufficient antecedent basis for this limitation in the claim. It is unclear whether the applicant intends the limitation to read "said external device" or "an external controller." For the purpose of applying prior art, the Office interprets the limitation to mean "an external controller."

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. **Claims 1-3, 45-47 and 64-65** are rejected under 35 U.S.C. 102(b) as being anticipated by Diekhans et al (US 5,043,861) (hereinafter Diekhans).
11. As for claims 1 and 45, Diekhans discloses a comprehensive input/output interface circuit for interfacing a process or machine controller with a sensor monitoring a condition within said process or machine or an actuator acting to modify said process or machine with a controller receiving inputs from said sensor or sending commands to said actuator [col. 1, lines 7-20, "The invention relates...the output contacts."]; said interface comprising:

first and second electrical terminals for coupling with said sensor or said actuator [the terminals are inherent to the common plug; col. 2, lines 7-11, "The contacts, sensors...input/output circuit board."];

a plurality of operation mode circuits providing different signal type input and output functions including a digital input function, a digital output function, an analog input function, and an analog output function [col. 1, lines 7-20, "The invention relates...the output contacts."]; and

means for the controlling activation and deactivation of different ones of said operation mode circuits to provide a selected ones of said signal type input and output functions [col. 2, lines 10-18, "Drive of the input and output...during multiplex operation."].

12. As for claims 2 and 46, Diekhans discloses the interface of claims 1 and 45 wherein said means for controlling activation and deactivation including a microcontroller [col. 1, lines 16-17, "input or output circuits"; col. 2, lines 10-18, "Drive of the input and output...during multiplex operation."].
13. As for claims 3 and 47, Diekhans discloses the interface of claims 2 and 46, wherein said microcontroller is adapted to receive control signals from an external controller [processor CPR, Fig. 1; col. 2, lines 58-66, "Fig. 1 is a general...provided on the processor."].
14. As for claim 64, Diekhans discloses the interface of claim 1, further comprising means for controlling current delivered to or drawn by said first external device by providing a substantially constant current to said first external device [col. 1, line 62 – col. 2, line 6, "The users connected to...input processing is assured."].

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15. As for claim 65, Diekhans discloses the interface of claim 64, wherein said first external device comprises an actuator [col. 1, lines 62-63, "The users connected to the outputs...or heat generators...."].
16. **Claims 6-20, 22-44 and 49-51, 53, 55, 58-62, 79 and 81** are rejected under 35 U.S.C. 102(b) as being anticipated by McLeish et al (US 5,014,238) (hereinafter McLeish).
17. As for claim 6, McLeish discloses an electrical input and output (I/O) interface comprising:
 - a first port for coupling said interface to a first external device [col. 4, lines 30-34, "A field device 4...or field device 4."];
 - a second port for coupling said interface with a second device [col. 4, lines 30-34, "A field device 4...or field device 4."];
 - an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output [col. 4, lines 30-58, "A field device 4...of keyboard 10."; col. 5, lines 25-28, "The input-output device...referred to above."]; and
 - an operation selector selecting said operation performed by said operating circuit from among a plurality of operations [col. 5, lines 25-68, "The input-output device...base and the span."].
18. As for claim 7, McLeish discloses the interface of claim 6, wherein said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage and current based signals over a multiple orders of magnitude signal range

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between a controller and a transducer [col. 4, lines 30-55, "A field device...referred to above."].

19. As for claim 8, McLeish discloses the interface in claim 6, wherein said first port including first and second electrical terminals [col. 4, lines 30-34, "A field device 4...or field device 4."].
20. As for claims 9-13, McLeish discloses the interface in claim 6, wherein said first external device comprises either a sensor or an actuator of a machine or process and said sensor or actuator are used to monitor or control said machine or process [col. 5, lines 25-68, "The input-output device...base and the span."].
21. As for claim 14, McLeish discloses the interface in claim 6, wherein said first external device comprises a sensor generating a voltage signal [col. 5, lines 51-57, "Define the sensor...-current."].
22. As for claim 15, McLeish discloses the interface in claim 6, wherein said first external device comprises a sensor generating a current signal [col. 5, lines 51-57, "Define the sensor...-current."].
23. As for claim 16, McLeish discloses the interface in claim 6, wherein said second device comprising an external controller [MP 3, Fig. 2].
24. As for claim 17, McLeish discloses the interface in claim 6, wherein said second device consisting of a controller and an isolation circuit interposed between said interface and said external controller [col. 5, lines 49-58, "The signal conditioning...of keyboard 10."].

25. As for claims 18-20, McLeish discloses the interface in claim 6, wherein said second port including a third terminal for communicating data, control or commands, and clock [col. 4, lines 30-55, "A field device...referred to above."].
26. As for claim 22, McLeish discloses the interface in claim 6, wherein said operating circuit including a plurality of different operating mode circuits [col. 4, lines 9-22, "The input-output device...also be utilized."].
27. As for claim 23, McLeish discloses the interface in claim 6, wherein said operating circuit includes means for configuring said operating circuit in a particular mode of operation [col. 5, lines 25-68, "The input-output device...base and the span."].
28. As for claim 24, McLeish discloses the interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof [col. 4, lines 30-55, "A field device...referred to above."].
29. As for claim 25, McLeish discloses the interface in claim 23, wherein said mode of operation selected from the set of operating modes consisting of a Mode 1 operating mode, a Mode 2 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof [col. 5, lines 25-68, "The input-output device...base and the span."].
30. As for claim 26, McLeish discloses the interface in claim 6, wherein said operation selector selects an operating mode from among a plurality of defined modes of operation [col. 5, lines 25-68, "The input-output device...base and the span."].

31. As for claim 27, McLeish discloses the interface in claim 6, wherein said operation selector comprising a microcontroller [col. 4, lines 9-22, "The input-output device... also be utilized."].
32. As for claim 28, McLeish discloses the interface in claim 6, wherein said operation selector comprising a microcontroller coupled with at least one analog-to-digital converter for converting analog signals to digital signals for processing by said microcontroller [col. 1, lines 36-47, "Furthermore, U.S. Pat... and digital signals."]
33. As for claim 29, McLeish discloses the interface in claim 6, wherein said operation selector microcontroller having a plurality of control lines for receiving input signals and a plurality of output signals to influence the operation performed by said operating circuit [Fig. 1; col. 4, lines 30-55, "A field device...referred to above."].
34. As for claim 30, McLeish discloses the interface in claim 6, wherein said plurality of operations including a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].
35. As for claim 31, McLeish discloses the interface in claim 6, wherein said plurality of operations including a mode of operation selected from the set of operating modes consisting of a Mode 1 operating mode, a Mode 2 15 operating mode, a Mode 3 operating mode, a Mode 4 operating mode, a Mode 5 operating mode, a Mode 6 operating mode, a Mode 7 operating mode, and combinations thereof [col. 5, lines 25-68, "The input-output device...base and the span."].

36. As for claim 32, McLeish discloses the interface in claim 6, wherein said operation selector being operative to activate portions of said operating circuit and to deactivate portions of said operating circuit to define an active circuit that performs a selected operation [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].
37. As for claim 33, McLeish discloses the interface in claim 6, wherein said operating circuit comprising a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected operation [col. 4, lines 9-22, "The input-output device...also be utilized."; col. 5, lines 25-68, "The input-output device...base and the span."].
38. As for claim 34, McLeish discloses the interface in claim 6, wherein said operation selector being operative to activate said modules to process a signal of a particular signal type [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].
39. As for claim 35, McLeish discloses the interface in claim 6, wherein said particular signal type comprises either an input signal type or an output signal type or both [col. 4, lines 30-55, "A field device...referred to above."].
40. As for claim 36, McLeish discloses the interface in claim 6, wherein said interface communicating an output command to one of said first or second device commanding said external device to operate in a status corresponding to said command; and monitoring the

actual operating status of said external device; said actual operating status being the same or different from the commanded status [col. 5, lines 34-56, "Means 20 for generating...gallons per minute."].

41. As for claims 37-39, McLeish discloses the interface in claim 6, wherein one of said first and second device comprise an actuator and the other of said first and second device comprise a sensor [col. 5, lines 25-68, "The input-output device...base and the span."].

42. As for claims 40 and 41, McLeish discloses the interface in claim 6, wherein said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

43. As for claim 42, McLeish discloses the interface in claim 6, wherein:

said interface is a comprehensive universal configurable interface for interfacing a multiplicity of analog, digital, voltage, and current based signals over a multiple orders of magnitude signal range between a controller and a transducer [col. 4, lines 30-55, "A field device...referred to above."];

said first port including first and second electrical terminals [col. 4, lines 30-55, "A field device...referred to above."];

said first external device comprises either a sensor or an actuator of a machine or process [col. 5, lines 25-68, "The input-output device...base and the span."];

said first external device comprises a sensor generating a voltage or a current signal [col. 5, lines 25-68, "The input-output device...base and the span."];

said second device consisting of a controller and an isolation circuit interposed between said interface and said external controller [col. 3, lines 64-66, "Each MP 3...input output device 2."; col. 5, lines 49-58, "The signal conditioning...of keyboard 10."];

said second port including a third terminal for communicating at least one of data, control or commands, and clock [col. 4, lines 30-55, "A field device...referred to above."];

said operating circuit including a plurality of different operating mode circuits, and said operating circuit including means for configuring said operating circuit to operate in a particular mode of operation [col. 4, lines 9-22, "The input-output device...also be utilized."; col. 5, lines 25-68, "The input-output device...base and the span."];

said mode of operation selected from the set of operating modes consisting of a digital input signal mode, a digital output signal mode, an analog input signal mode, an analog output signal mode, and combinations thereof [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."];

said operation selector comprising a microcontroller coupled with at least one analog-to-digital converter for converting analog signals to digital signals for processing by said microcontroller [col. 1, lines 36-47, "Furthermore, U.S. Pat...and digital signals."];

said operation selector being operative to activate portions of said operating circuit and to deactivate other portions of said operating circuit to define an active circuit that performs a selected operation [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

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44. As for claim 43, McLeish discloses the interface in claim 6, wherein:

said operating circuit comprising a plurality of modular circuits each for performing a predetermined signal processing function with respect to input signals and output signals, and said operation selector being operative to activate ones of said modules and to deactivate other ones of said modules to define one or more active modules that performs a selected operation [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."];

said operation selector being operative to activate said modules to process a signal of a particular signal type [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."];

said interface further comprising input current detection means for directly detecting a sensor current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

45. As for claims 53 and 55, McLeish discloses the interface in claim 6, wherein said interface further comprising a protection circuit for reducing damage to said interface or to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices [col. 4, lines 49-58, "The signal conditioning...of keyboard 10."].

46. As for claims 58 and 59, McLeish discloses the interface in claim 55, wherein said interface further comprising input current detection means for directly detecting a sensor

current rather than detecting sensor voltage determine sensor state to thereby reduce the effects of induced electrical noise appearing on sensor voltage on conductors coupling said sensor to said interface [col. 4, lines 30-55, "A field device...referred to above."; col. 5, lines 25-68, "The input-output device...base and the span."].

47. As for claims 60 and 62, McLeish discloses the interface in claim 6, wherein said interface further comprising means for measuring power, both real and imaginary, by dynamically switching between voltage measurements and current measurements [col. 5, lines 25-68, "The input-output device...base and the span."].
48. As for claim 61, McLeish discloses the interface in claim 6, wherein said interface further comprising: a voltage measuring circuit and a current measurement circuit each coupleable to a load, a switching circuit for dynamically switching between said voltage measurement circuit and said current measurement circuit; said combination of voltage measurements and said current measurements permitting measurement of power consumed by said load [col. 5, lines 25-68, "The input-output device...base and the span."].
49. As for claim 79, McLeish discloses the interface in claim 6, wherein said interface is formed as a single integrated device within a common enclosure [input-output device 2, Fig. 2].
50. As for claim 81, McLeish discloses the interface in claim 6, wherein said selectable operation of said interface to inter-operate with a plurality of different sensors, actuators, and other transducers materially reducing design and engineering time associated with designing, assembling, and debugging operation of a system including said interface [col. 2, lines 1-14, "Present digital...or output signals."].

51. As for claim 44, McLeish discloses an electrical input and output (I/O) interface comprising:

a first port for coupling said interface to a first external device [col. 4, lines 30-34, "A field device 4...or field device 4."];

a second port for coupling said interface with a second device [col. 4, lines 30-34, "A field device 4...or field device 4."]; and

an operating circuit communicating with a first signal set at said first port and communicating a second signal set at said second port and performing an operation on one of said first signal set and said second signal set as an input and generating the other one of said first signal set and said second signal set as an output [col. 4, lines 30-58, "A field device 4...of keyboard 10."; col. 5, lines 25-28, "The input-output device...referred to above."];

said operating circuit receiving an input from an external micro-controller directing a configuration of said operating circuit [col. 3, lines 64-66, "Each MP 3 is...input output device 2."].

52. As for claim 49, McLeish discloses an interface comprising:

an output circuit that communicates an output command to an external device coupled with said interface commanding said external device to operate in a state corresponding to said command [col. 3, line 67 – col. 2, line 3, "The input-output device...particularized herein."]; and

a monitor circuit that monitors the actual operating state of said external device [col. 5, lines 25-28, "The input-output device...4 referred to above."]; said actual operating state

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being the same or different from the commanded state [col. 6, lines 34-56, "Means 20 for generating...gallons per minute."].

53. As for claim 50, McLeish discloses the interface circuit in claim 49, wherein said actual operating state is different from the commanded state [col. 6, lines 34-56, "Means 20 for generating...gallons per minute."].

54. As for claim 51, McLeish discloses the interface in claim 49, wherein said state corresponding to a status [col. 5, lines 25-28, "The input-output device...4 referred to above."].

Claim Rejections - 35 USC § 103

55. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

56. **Claims 4, 5 and 48** are rejected under 35 U.S.C. 103(a) as being unpatentable over Diekhans. As for claims 4, 5 and 48, Diekhans teaches controlling activation and deactivation using a microcontroller; said microcontroller adapted to receive control signals from an external controller [col. 1, lines 16-17, "input or output circuits"; col. 2, lines 10-18, "Drive of the input and output...during multiplex operation."]. Diekhans further teaches an interface coupling with a sensor or actuator through electrical terminals [the terminals are inherent to the common plug; col. 2, lines 7-11, "The contacts, sensors...input/output circuit board."]. Diekhans does not explicitly teach coupling with said sensor or said actuator exclusively through only said first and said second electrical terminals. Official notice is

given that it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Diekhans by coupling with a sensor or actuator exclusively through first and second electrical terminals, because this is one of several known and obvious design choices.

57. **Claims 52 and 54** are rejected under 35 U.S.C. 103(a) as being obvious over Diekhans in view of Johnson (US 5,264,958). As for claims 52 and 54, Diekhans does not specifically disclose the use of a protection circuit. However, Johnson discloses the use of a protection circuit with an interface for reducing damage to said interface and connected devices that could otherwise occur as a result of misconnecting or miswiring said interface to an external device [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."].

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Diekhans by adding a protection circuit for reducing damage to said interface or to said first device or said second device that would otherwise result in damage to said interface as a result of misconnecting or miswiring said interface to one of said first or second external devices, because this would also provide protection from an inordinately high input voltage or a short circuit, as taught by Johnson [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."].

58. **Claims 56 and 57** are rejected under 35 U.S.C. 103(a) as being obvious over Diekhans in view of McLeish. As for claims 56 and 57, Diekhans does not specifically disclose the use of an input current detection circuit that detects the state of a sensor directly rather than detecting the sensor voltage. However, McLeish discloses the use of an input current detection circuit that detects the state of a sensor directly rather than detecting the sensor

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voltage [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."; col. 5, lines 51-57, "Define the sensor type...-current."]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Diekhans by using an input current detection circuit that detects the state of a sensor directly rather than detecting the sensor voltage, because this would provide for electrical protection from EMI interference and common mode voltage suppression, as taught by McLeish [col. 4, lines 31-43, "Referring now to Fig. 2...from the signals."].

59. **Claim 21** is rejected under 35 U.S.C. 103(a) as being unpatentable over McLeish.

McLeish does not specifically disclose the use of a fifth terminal. However, McLeish discloses the use of multiple terminals for communicating data, communicating control or commands and for communicating clock [col. 4, lines 30-55, "A field device...referred to above."]. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLeish to include five terminals, the third terminal for communicating data, the fourth terminal for communicating control or commands and the fifth terminal for communicating clock, because this is one of several known and obvious design choices.

60. **Claims 66-72 and 76-78** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Campau et al (US 6,206,482) (hereinafter Campau).

61. As for claims 66 and 68, McLeish discloses the use of signal conditioning circuitry which, as known to those skilled in the art, may include a constant current circuit [col. 4, lines 48-58, "The signal conditioning...of keyboard 10."]. However, McLeish does not specifically disclose providing a constant current control circuit for controlling a current drawn by a load device. Campau teaches providing a constant current control circuit for

controlling a current drawn by a load device, including a solenoid actuated valve [col. 2, line 58 – col. 3, line 7, “In prior art systems...the valve heating.”].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify McLeish by adding a constant current control circuit for controlling a current drawn by a load device, in order to open or close a valve, as taught by Campau [col. 2, line 58 – col. 3, line 7, “In prior art systems...the valve heating.”].

62. As for claim 67, McLeish discloses the interface of claim 66, said load device including a power level actuator in a process or machine [col. 9, lines 3-10, “The input output device...data acquisition systems.”].

63. As for claim 69, McLeish discloses the interface of claim 66, wherein said load device including an inductive load component, said constant current circuit being operative to reduce electromagnetic interference (EMI) and RFI (radio frequency interference) caused by energizing or de-energizing said load device [col. 9, lines 3-10, “The input output device...data acquisition systems.”].

64. As for claim 70, McLeish discloses the interface of claim 66, wherein said load device including a relay device [col. 9, lines 3-10, “The input output device...data acquisition systems.”].

65. As for claim 71, McLeish discloses the interface of claim 66, wherein said load device including a solenoid valve device [col. 9, lines 3-10, “The input output device...data acquisition systems.”].

66. As for claim 72, McLeish discloses the interface of claim 66, wherein said constant current circuit eliminating the need for 10 suppression circuits to suppress turn-on and

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turn-off mechanical shock to electromechanical devices and inductive loads [col. 9, lines 3-10, "The input output device... data acquisition systems."].

67. As for claim 76, McLeish discloses the interface of claim 66, wherein said load device including an inductive load component, 25 and said constant current circuit reducing destructive effects, both human and mechanical, of inductive $L(di/dt)$ based transients that occur when de-energizing inductive loads [col. 9, lines 3-10, "The input output device... data acquisition systems."].

68. **Claims 73-75** are rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Campau and in further view of Thomas et al (US 4,267,439) (hereinafter Thomas).

As for claims 73-75, McLeish does not specifically disclose the use of an incandescent lamp in conjunction with a constant current circuit. Thomas discloses the use of an incandescent lamp in conjunction with a constant current circuit [abstract, "Incandescent lamps are... operational lamp circuit."]. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish and Campau by providing a constant current from a constant current circuit to an incandescent lamp, in order to extend the usable life of a controlled incandescent lamp, as taught by Thomas [abstract, "Incandescent lamps are... operational lamp circuit."].

69. **Claim 80** is rejected under 35 U.S.C. 103(a) as being obvious over McLeish in view of Galecki et al (US 6,308,231) (hereinafter Galecki).

As for claim 80, McLeish does not specifically teach forming the interface on a single printed circuit substrate. Galecki teaches forming an I/O interface on a s on a single printed circuit substrate [abstract, "According to another aspect, an integrated circuit...]

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communication interface.”]. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the teachings of McLeish by forming the interface on a single printed circuit substrate, in order to simplify fabrication of the device.


Conclusion


70. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 4,855,905, note possible 102 reference; US 5,727,170, note Fig. 3; US 4,890,013, note current and voltage detection circuit; US 6,208,497, note constant current; US 6,154,680, note possible 102 reference; US 5,757,680, note first and second devices; US 4,278,916, note incandescent lamp with constant current; US 4,593,380, note Fig. 1; US 6,144,888, note Figs. 13-20; US 4,910,659, note input voltage range; US 6,115,654, note constant current; US 6,166,525, note solenoid control.

71. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron C Perez-Daple whose telephone number is (703)305-4897. The examiner can normally be reached from 9am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anil Khatri can be reached on (703)305-0282. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

 9/5/03
Aaron Perez-Daple


RAMESH PATEL
PRIMARY EXAMINER 9/8/03
For Anil Khatri